ON THE

APPLICATION OF ELECTRICITY

TO THE

CENTRAL NERVOUS SYSTEM.

A REPLY TO THE OBJECTIONS OF ANSTIE, BROWN-SÉQUARD, CYON, AND OTHERS.

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ON THE APPLICATION OF ELECTRICITY TO THE CENTRAL NERVOUS SYSTEM. A REPLY TO THE OBJECTIONS OF ANSTIE, BROWN-SÉQUARD, CYON, AND OTHERS.

It seems to be the fate of electro-therapeutics, in spite of its great and growing popularity, to be met at every stage of its advance by severe opposition. We do not deprecate this; we believe rather that here, as in every branch of science, conflict is to be courted more than feared, and that the discipline and exercise and watchfulness that are required to provide for and overcome opposition will tend to make the growth of electro-therapeutics more healthful and more permanent. At the present time, every special advance or attempt at advance on the part of electro-therapeutists encounters the same kind of difficulties that beset its birth and infancy—with this difference only, that now they are overcome much more speedily. The processes of opposition, and the laws by which it develops, are the same now as they were one hundred years ago.

The same objections that are now brought against central galvanization, general faradization, electrolysis, localized galvanization of the nerve-centres, and to the use of electricity in certain special diseases in medicine and surgery, have been successively brought against peripheral faradization and galvanization in the treatment of paralysis. Among those physicians who sympathize with civilization and the nineteenth

most potent of remedial agents. There are those who can bear it in wellnigh limitless doses.

There are those who can bear it and who are benefited by it, but only when given with delicacy and great caution. Now, it is possible to galvanize the cervical sympathetic in all three classes, except the first, without doing any serious injury, permanent or temporary.

All our most potent remedies are dangerous when used dangerously.

The most recent and most radical objection to galvanization of the brain comes from Dr. E. Cyon,[1] of St. Petersburg. In attempting to reply to his objections, we are reminded of a remark once made by one of our most eminent medical authorities: that "there is a tendency in this country to accept with deference any new theories, provided they come *from a great distance.*" The objections brought by Cyon are so stale and so inconsistent, and withal have been so often refuted by practical experience, that if brought by any one residing in our midst they would not be regarded as worthy of consideration. His objections to the method of galvanization of the brain introduced by Remak (not to our method of *central galvanization*, which is a method radically different) are these:

1. That a current of sufficient strength to penetrate and affect the portions of the brain that are most liable to disease, as the corpora striata, optic thalami, and pons Varolii, cannot be applied to the head without doing more harm than good by also irritating other parts.

2. That the cases which have been treated by this method have been so carelessly and unscientifically studied, and so recklessly reported, that they have no scientific value. He states that electro-therapeutists profess to make precise diag-

[1] "Principes d'Électro-thérapie." Paris, 1873, pp. 190–196. This treatise, which was written in 1868–'69, is of necessity considerably behind the times. It discourses upon certain questions of electro-physics, physiology, and therapeutics, in a philosophical manner, although on all points in which he is correct he has been anticipated long ago by other writers. The errors and defects of the work, which are very conspicuous in the chapter above referred to, are indirectly the result of narrow or insufficient practical experience, and utterly incorrect notions as to the therapeutical action of electricity.

noses of the seat of brain-diseases, and then treat them by galvanization of the brain, combined with various other remedies, and the results, if favorable, are published forthwith. Dr. Cyon goes on to say that such in general is the value of the observations that are given as proofs of the curative effects obtained. This statement we believe to be thoroughly untrue. What is true of certain Germans and Russians is not true of all, if indeed of the majority of electro-therapeutists. The therapeutics of galvanization of the brain have been studied by men who have been trained to the habit of close and discriminating observation; who recognize and bear constantly in mind the enormous complications that beset all therapeutics; who have worked under the gaze of watchful skeptics, and with the everlasting motto, *post hoc ergo propter hoc*, incessantly ringing in their ears; men, too, who have carried conscience into science, and have reported the results to the world just as they were revealed to them.

It is of very little practical consequence whether these effects already alluded to are due to the direct passage of the current through the brain or to the reflex action of the current on the brain through the sensory nerves. Reflex action comes in to explain the therapeutic effects of electricity, however and wherever applied. Granting for one moment, what is not true, that mild currents cannot penetrate the brain, this would be no reason whatever for abandoning the electrical treatment of the brain so long as experience shows that benefit is derived thereby. It is, however, not true that mild currents do not penetrate the brain. The experiments of Burckhardt and Ziemssen, with which Cyon seems not to be familiar, have shown very clearly that the galvanic current can be sent through the parts of the brain that we chiefly desire to affect by comparatively mild external applications.

These experiments were made with a very delicate reflecting galvanometer—needles connected with which were inserted into the brain through the skull—while the galvanic current was applied externally.[1]

But even were Cyon correct in his physical and physiolo-

[1] These experiments are recorded in Ziemssen's "Electricität in der Medicin," fourth edition, 1872, erste hälfte, pp. 27–39.

gical theories, he is not warranted, on the strength of those theories alone, in recommending electro-therapeutists, who are every day relieving and curing patients by galvanizing the brain, to abandon that method. Therapeutics is one science, physiology is another. Of all the sciences, physiology is the least exact, and, until some genius shall arise who shall do for it what Newton did for celestial dynamics, it must remain inexact. Pathology, which, as has been well said, is but the shady side of physiology, is also inexact. If we know not the nature of life, we cannot know the nature of death. Only so far as physiology, which deals with life, becomes exact and complete, can pathology, which deals with the various degrees of death, become exact and complete. On both of these sciences we should hold our opinions as a Bedouin Arab holds his tents, ready to be up and off at a moment's warning.

Therapeutics, then, which is a science of experience, cannot be thoroughly taught in the laboratory of the physiologist or pathologist. Physiology and pathology, which are now but masses of rapidly-accumulating facts and theories, at best partial, one-sided, and ill-defined, and oftentimes erroneous, where each new doctrine swallows up its predecessors, to be in turn devoured by the doctrines of the future, cannot furnish a basis for rational electro-therapeutics. Hence our objections to the statement reiterated in books, in lectures, and in journals, that electro-physiology must be the basis for all electro-therapeutics.

If it depended on electro-physiology for its existence and advancement, electro-therapeutics would die, and with little hope of resurrection. For what, indeed, do we know of electro-physiology?

Even the researches of Du-Bois Reymond on animal electricity are already losing ground, and high authority declares that the so-called muscular current is a myth.[1] We know more of the physiological action of electricity on the body than

[1] We refer to the researches of Prof. John Trowbridge, of Harvard University. *A résumé* of his experiments and his conclusions, obtained from correspondence and from abstracts of papers that have been published by him, have already been presented to the Electro-Therapeutical Society of New York, and will in time be published.

of the physiological action of our most used internal medicines, but our knowledge is not enough to make a satisfactory basis for the science of electro-therapeutics. If there is any thing in the world that electricity can do, it is to relieve pain, but how could such power be predicted from our present knowledge of electro-physiology and pathology? We find by experience that it *does* relieve pain, and then by physiology and pathology try to explain as best we can *how* it does it.

The method of using electricity that we have devised and employed during the past three years, we have termed central galvanization,[1] to distinguish it from the five other methods of using electricity. This method, when employed by those who have become familiar with it, is absolutely safe, and should never cause, even in the most impressible, effects either dangerous or alarming. Moreover, this method is incomparably more efficient as a tonic remedy in diseases of the central nervous system, than any localized treatment of those parts.

The objection urged by Cyon, that, because we cannot tell the precise seat of the lesion, therefore we should not attempt galvanization of the brain, is unworthy of a practical therapeutist.

That we cannot always and truly tell the exact seat of the lesion in many diseases of the brain, those who know most of nervous diseases will be most ready to concede; but in galvanizing the brain it is not necessary to know the precise pathology. The healthy as well as the diseased parts of the brain may be traversed by the current with benefit.

The tendency of electrization, as of other tonic remedies, is to restore diseased parts to health, to make strong parts still stronger.

The best results of electrical treatment are not obtained by confining the direct action of the current to the seat of the disease, but by a subdivision of central, general, and peripheral treatment. In hemiplegia, for example, depending on one-sided cerebral lesion, much benefit is derived from faradization of the paralyzed muscles, some benefit from galvanization of

[1] This method was described in a general way in the *Medical Record*, December 15, 1871, and in full detail in the New York Medical Journal, October, 1872, and was illustrated by cases in the same journal, May, 1873.

the brain and of the cervical sympathetic, and very great benefit oftentimes, especially in the debilitated, from general faradization and central galvanization, and the best results of all may appear when all the different methods have been employed. If we refuse to galvanize the brain, because we do not fully understand its physiology and pathology, we must, to be consistent, reject the medical use of electricity in every mode of application. While we probably know more of the action of electricity on the body than of the action of almost any other remedy, we do not know enough to determine with certainty just what its precise, complete, and ultimate action is in any disease or on any part of the human system.

We do know by experience that, when properly applied to the body in some one of the half-dozen different general methods now employed, it relieves pain, induces sleep, and improves local and general nutrition as no other single remedy can do, and on the basis of this experience, rather than on the physiological basis, we employ it.

Meanwhile, it is certainly proper to extend, so far as possible, our knowledge of physiology, pathology, and of physics also, so that we may perhaps explain our therapeutics and make it more scientific.

Pushed to their necessary conclusions, the arguments of Cyon would not only deprive the world of electro-therapeutics, but of therapeutics of every form, and even of hygiene itself. If physicians must wait for physiology and pathology to attain exactitude; if we must know just where medicine goes when it enters the system, and just what it does when it gets there; if we are to abstain from treating any disease whose pathology is not fully revealed; and if we are to be required to limit the action of our remedies solely to the part that is diseased, then we have only to close our medical schools, our offices, and our drug-shops, surrender our diplomas, and in a body attend the funeral of the science of medicine.

Among other statements of Cyon to which exception may be taken, is the following:

He says that Smee's battery is not adapted for electro-therapeutics, and that the faradic current should not be used on the spine. In the face of the facts that the patients cured

or relieved by Smee's battery may be numbered by tens of thousands, and that the faradic current in the hands of hundreds of physicians is every day applied to the spine with less risk of causing injury than if the galvanic current were used, and sometimes relieving spinal symptoms more successfully than the galvanic, a formal reply seems needless.

Who could tell beforehand, without experience, whether opium would produce sleep? Who could predict that arsenic would act as a tonic, and is there a living man who knows how it so acts? How long would it have taken physiology and pathology to have discovered the uses of ninety-five out of a hundred of the remedies in daily use for the relief and cure of disease?

It is experience that has given us these remedies, and it is experience that perpetuates their use among men of science, while physiology and pathology are slowly helping us to use remedies more intelligently.

Just as therapeutics in general, based on experience, is far in advance of physiology and pathology in general, so electro-therapeutics, also based on experience, is, we are happy to say, far in advance of electro-physiology and electro-pathology.

For those who are entering upon the study of electro-therapeutics, the following suggestions, based on the above remarks, may perhaps appropriately be offered:

1. That they make themselves masters of electro-physics, especially of those principles and laws that directly or indirectly have a practical bearing on electro-therapeutics. Electricity in its physical relations is a study of great difficulty, but it is as enticing as it is difficult, and will, for its own sake, and without reference to its practical application, repay the most studious attention. But, whether attractive or not, the principles of electro-physics must be mastered by those who aspire to mastership in electro-therapeutics. A knowledge of physiology and pathology, however profound, will not supply its place. Many, if not most, of the discouragements of those who begin the study of electro-therapeutics, are the result of a defective knowledge of the physical principles of the general science of electrology.

In the construction, modification, repair, and management

of batteries and electrodes, and in the endeavor to understand the countless and complex phenomena of electro-physiology and therapeutics, we stand in constant need of clear ideas on electro-physics.

2. That they do not allow themselves to be carried away by the specious but utterly erroneous notion that electro-therapeutics must be based on electro-physiology. We have been taught in certain quarters that electro-therapeutics is the daughter of electro-physiology; it would be more just to regard the two sciences as sisters of pretty nearly the same age. The best growth and development, however, has thus far been obtained by electro-therapeutics.

It is well to acquire and compass the fragmentary facts that make up what is known as electro-physiology, and by experiments on animals and on the human subject, living and dead, to confirm or correct what are supposed to be its laws. But in electro-physiology the facts and science of to-day may be the fallacies and superstitions of to-morrow. To build on such a foundation is to build on sand.

3. To remember always that the basis of electro-therapeutics, as of all other therapeutics, is *clinical experience.* He who attempts to build on any other foundation must surely fail. The most that physiology can do for electro-therapeutics is to guide, to explain, to illustrate, to confirm.

4. That they think and experiment independently for themselves on this subject, and be not cowed by distant authority.